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No 3

GEOGRAPHIC INTELLIGENCE REPORT

NOVAYA ZEMLYA

CIA/RR–G–18

January 1958

CENTRAL INTELLIGENCE AGENCY

OFFICE OF RESEARCH AND REPORTS

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ERRATA

On pages iii and 1, the orientation map number 12697 should read 26170.

On page v, footnote, change "coordinate" to "coordinated".

On page 7, line 36, "winter" should read "summer".

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Photographs
(abbreviated titles)

Maps

NOVAYA ZEMLYA*

Summary

Novaya Zemlya, a long, mountainous archipelago consisting of two major islands and a number of smaller ones strategically located off the Soviet Arctic mainland, has become a center of Soviet polar air operations despite its cold, inhospitable climate and rugged terrain. At present the landing, weather, and communications facilities of the islands are used by aircraft bringing supplies to the drifting stations and weather and ice reconnaissance missions in the Arctic Basin. In the event of a future global conflict, however, the archipelago would probably serve as a link in an early warning system and perhaps as the site of a defensive base for fighter-interceptor aircraft, even though its usefulness is currently limited by logistic and surveillance problems. At least one airfield, Belush'ya Guba (Bay), is now capable of supporting jet fighters and piston medium bombers; and several others may also be suitable for aircraft of these types. The airfields would probably not be expanded to accommodate intercontinental bombers since these would no doubt be based deep within the USSR and would refuel from mainland bases. Ten polar stations and nine probable radar sites are scattered throughout the length of the islands and support air operations. Additional support is provided by radio facilities at all airfields and settlements.

Novaya Zemlya has recently become an important nuclear testing area for the Soviet Union. The archipelago's isolated position makes it a valuable test site since there is less danger of radiation fallout and foreign surveillance. The first test was detected in late September 1955, and four additional detonations have occurred since then, during September and October 1957.

The high latitudinal position of the archipelago produces many environmental problems. The climate of the islands is characterized by brief, cold, foggy summers; long, cold, humid winters; ever present clouds; and incessant winds. The persistent high winds often reach velocities that prohibit air operations. Low winter temperatures hamper outdoor activities; when accompanied by strong winds, all operations, including flying, are curtailed. Ice-free navigation is possible for only a few months during the summer, and maritime activity is limited to pelagic fishing and passenger and supply service. Seasonal variations in the length of daylight, which culminate in a 2- to 3-month period of total darkness in winter, affect all activities in the islands.

*D/GG has coordinate this report with the appropriate components of ORR, OCI, and OSI.

The economy of the islands does little to support present military and scientific activities. Minerals are found on the islands but their exploitation is limited by the isolated position of the archipelago and by the poor quality of the deposits, which include iron, coal, gold, and uranium. With the exception of coal, which is burned locally, the minerals produced are sent to the mainland. The native Nentsy and some Russians are engaged in trapping, herding, hunting, and fishing; but the products of these activities, most of which are consumed locally, provide only a small portion of the islands' food requirements. The remainder must be imported.

The population of Novaya Zemlya, although the largest of any of the Arctic island groups, is sparse and is limited to a few coastal settlements. Soviet personnel and forced laborers constitute the largest part of the population, the Nentsy being found only in small numbers living at a near-subsistence level. Soviet personnel man the polar stations, airfields, and other installations that require skilled or trained workers; forced labor is used in mining.

The islands are under the political administration of Arkhangel'skaya Oblast', but control is probably exercised by military forces and by the Chief Directorate of the Northern Sea Route (GUSMP), whose headquarters are in Moscow.

I. Introduction

Novaya Zemlya is an area of increasing importance to the USSR as both a northern frontier and a link in the expanding network of Soviet Arctic activity. The position of the archipelago as the westernmost island group in the Arctic defense chain of the Soviet Union gives Novaya Zemlya a unique strategic value that in many respects outweighs its environmental disadvantages. The chief deterrent to its military development is the harsh northern climate, which curtails the navigation season and presents serious problems to air activity. These handicaps, though critical, are being materially reduced as a result of an extensive program of Arctic research.

The spectacular scientific and technological advances of the past decade have made possible more intensive utilization of all Arctic bases, including Novaya Zemlya. Although serious consideration of the Arctic region by the Russians began in the late nineteenth and early twentieth centuries, not until recently did its full potentialities emerge. The Arctic now provides a maritime transportation route of increasing significance, a potential intercontinental air route, and an accessible source of raw materials and semifinished products. The recognition of these potentialities is reflected in Soviet military strategy. The five major Arctic island groups and the northern littoral have become integral parts of the northern offense-defense perimeter of the Soviet Union (see Map 12697).

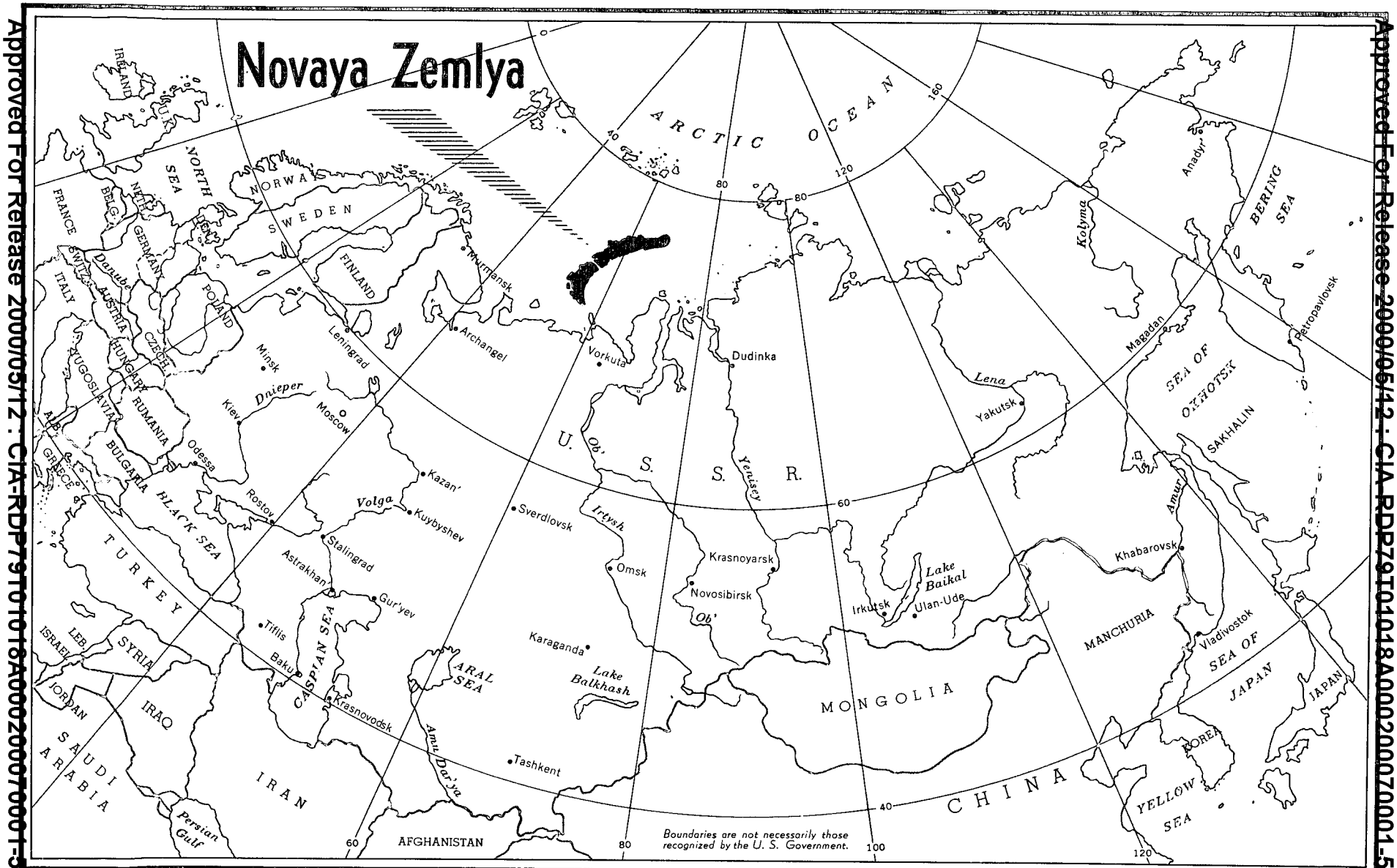
The Arctic offense-defense perimeter, which at this latitude (70°-77°N), extends nearly half way around the world -- facing Greenland, Canada, and Alaska across the Arctic Basin. Although military activity is increasing, the airfields and radar stations scattered throughout the length of the Soviet Arctic could not at present defend transpolar approaches to industrial centers on the mainland. The existing distribution would provide a relatively good defense in the western sector, which includes Novaya Zemlya, but large gaps still occur in the central and eastern sectors. From the standpoint of offense, the role of all areas along the northern perimeter is limited by logistic problems arising from their severe climate and great distances from centers of supply. Intercontinental bombers are and probably will continue to be based in the interior of the country near sources of supply, even in the event of open hostilities.

Unlike some of the other island groups, Novaya Zemlya has always been undisputedly under Russian sovereignty. Proximity to

the mainland has lent tacit approval to Russian jurisdiction since the early days of polar exploration. The discovery and early history of Novaya Zemlya are not recorded. In the sixteenth century, however, it was a source of walrus tusks, seal skins, and seal oil for Russian traders. In the seventeenth century gold, silver, and precious stones were the object of several expeditions, and the search for a Northeast Passage also brought many ships to the islands. From the 18th century to the present, many government expeditions have made mapping surveys of the topography and geology and have studied the flora and fauna. 1/*The first permanent settlers began to arrive in the late 19th century, and the population has continued to grow as polar stations and airfields have been established.

Novaya Zemlya stretches for 620 miles (1,000 kilometers) in a curving northeast-southwest direction and varies from 40 to 90 miles (64 to 145 kilometers) in width (see Map 25881). The total area is 31,374 square miles (81,280 square kilometers). The two major islands -- North and South Islands -- are separated by the narrow, winding Proliv (Strait) Matochkin Shar. An axial mountain range extends nearly the entire length of the islands and reaches its greatest height near the strait. About 25 percent of the land is ice-covered. The remainder has a cover of tundra vegetation consisting of mosses, lichens, and shrubs; a brilliant display of ephemeral flowers appears in spring. Brief, cold, foggy summers alternate with long, cold, and humid winters; clouds and incessant winds are characteristic of both seasons. 2/

* For serially numbered source references, see Appendix B.



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II. Air Operations

The current Soviet program of establishing and expanding airfields in the Arctic has resulted in the development of at least one major airfield on Novaya Zemlya; and, in the event of a hot war, many of the small airfields could be quickly expanded. Novaya Zemlya could thus serve as a forward base for jet interceptor fighters. The airfields of Novaya Zemlya, together with the radar installations, would contribute materially to the defense of the western sector of the Soviet Arctic against approaching aircraft.

At first glance the location of the archipelago appears particularly favorable, since it lies north of the mainland and points toward the North Pole. However, the susceptibility of the islands to various forms of surveillance reduces their utility for military air operations. Logistic difficulties also are a serious deterrent to the development of intercontinental bomber bases on Novaya Zemlya. Bulk commodities in large quantities can be brought to the islands only during the summer navigation season. Furthermore, several airfields on the mainland are nearly as far north as Belush'ya Guba (Bay) airfield on Novaya Zemlya and are connected by year-round transportation routes with industrial and supply centers of the Soviet Union. Two of the largest airfields of the Kol'skiy Poluostrov (Peninsula) on the Soviet mainland, Severomorsk and Pechenga, are supplied by the Murmansk Railroad; but, like the bases on Novaya Zemlya, also are open to occasional foreign observation. Consequently intercontinental bombers would have to be based farther inland. On a transpolar air strike, these bombers would probably refuel from Severomorsk, Pechenga, and other airbases along the northern edge of the mainland before continuing across the Arctic Basin.

A. Distribution of Air Facilities

Air facilities, consisting of airfields and seaplane stations, are distributed along the coastal perimeter of Novaya Zemlya. Originally they were built to serve nearby settlements and polar stations. In recent years, however, some of the airfields have been expanded and at least one is now probably capable of supporting jet fighters and piston medium bombers.

The largest airfield and seaplane station on Novaya Zemlya is located several miles northeast of the settlement of Belush'ya Guba (see map No. 25993). During World War II, the airfield consisted of two intersecting strips oriented NW-SE and E-W (Figure 1), but their alignment may have been changed since then. The NW-SE runway was 6,600 feet (2,000 meters) long and 450 feet (137 meters) wide,

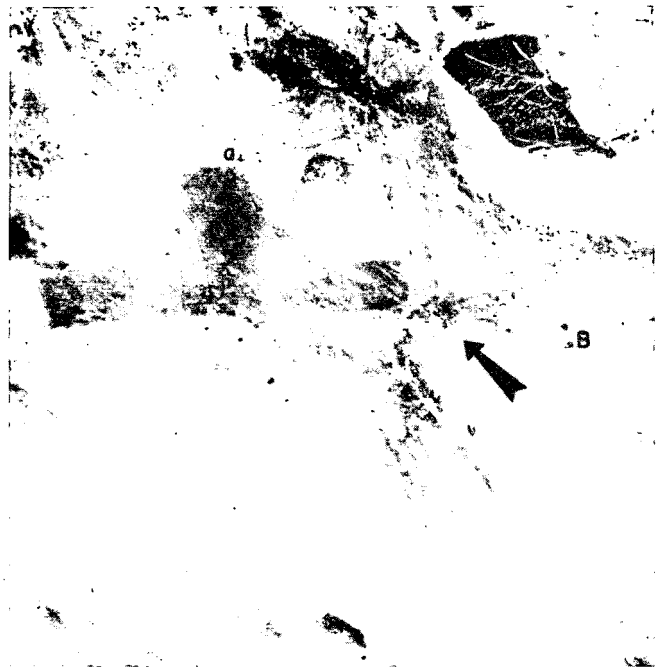
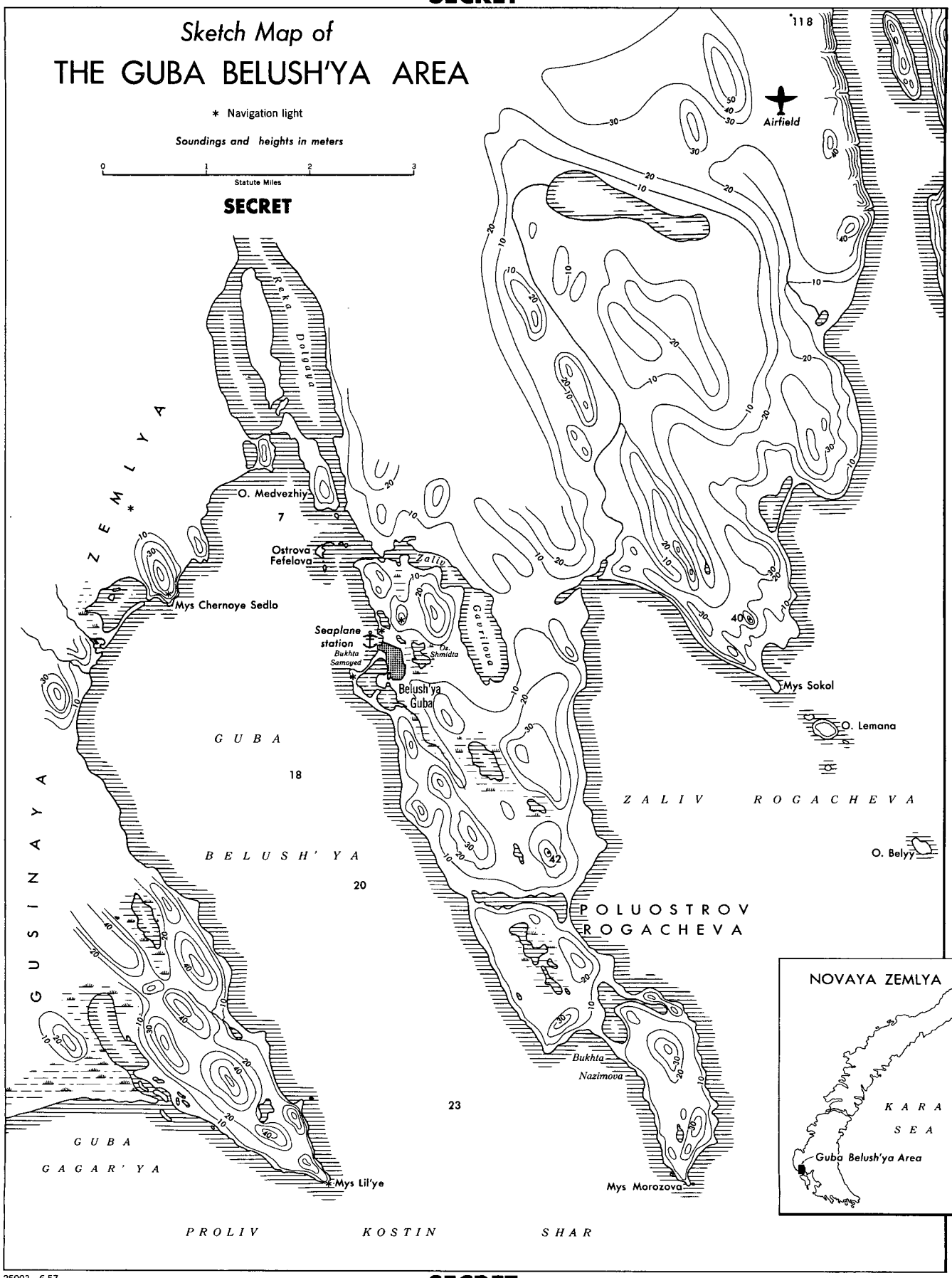


Figure 1. Airfield at Belush'ya Guba (1943). Arrow points to the barracks area.

Figure 2. Seaplane station at Belush'ya Guba (1943). Note the three amphibious aircraft and two freighters anchored in Bukhta Samoyed.



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and the E-W runway measured 2,250 feet (685 meters) by 330 feet (100 meters). 3/ Only the former could handle fighters and piston medium bombers. Helicopters, which are used extensively in the Arctic, are undoubtedly based here and would not require a large landing space. Both airstrips have natural gravel and earth surfaces; in winter, they are covered with packed snow and could be extended to accomodate larger aircraft. The runways are not serviceable during the spring thaw from mid-May to mid-June. Facilities at the airfield probably include POL storage tanks, repair shops, barracks, and various storage buildings. A wireless transmitter and meteorological station provide communications and weather information. Three radar sites are known to be in operation near Belush'ya Guba, and there may be others that have not been reported. 4/

During World War II, a seaplane station was located on Bukhta (Bay) Samoyed at the western edge of Belush'ya Guba settlement (Figure 2). The bay provided unlimited landing space during the summer, and the installations at that time included a landing ramp, a parking apron, cranes, barracks, and several small repair sheds. 5/ The station is probably not used at present since seaplanes have been replaced to a great extent by helicopters, which are more versatile.

The remaining airfields on Novaya Zemlya are small and little is known about them. The airfield and seaplane station at the Krasino polar station were first noted in 1948. 6/ The air facilities were under the direction of the Chief Directorate of the Northern Sea Route (GUSMP) at this time; but they are not listed on a 1956 map of GUSMP polar stations, which suggests that the facilities have been taken over by some other service, probably the navy.

The airfield at Mys (Cape) Zhelaniya is located near the polar station. It has a natural-surfaced runway that is usually swept clear of winter snows by the persistent winds. In the late 1930's landings were reportedly difficult for 4-engine aircraft, but recent notices of landings indicate that the airfield is still in operation. 7/ "Flying observatories" bound for the North Pole and planes conducting ice reconnaissance use the facilities of the field.

An airstrip has been reported near the Matochkin Shar polar station, which is on the route to Ostrov (Island) Rudol'fa in

Zemlya Frantsa-Iosifa. The strip is less than 2,000 feet (610 meters) long and is used by the station for supply and other functions. 8/ Although large aircraft cannot land here, they would probably use the station's radio signal to orient their northward flight.

Several polar stations are known to have small airstrips used for delivery of supplies and transfer of personnel. The strips are probably about 2,000 feet (610 meters) long and would accomodate only light transports. Facilities for some aircraft maintenance and necessary servicing are installed at the polar stations. Runways are located at Mys Karmakuly, Mys Stolbovoy, and Russkaya Gavan' (Harbor) and small airstrips at the settlements of Smidovich, Krestovaya Guba, Lagernoye, Zaliv (Gulf) Nordenshel'da, and Ostrov Pakhtusova.

B. Environmental Influences

Air operations, which provide the primary physical link between Novaya Zemlya and the mainland, have been developed under severe climatic and terrain conditions. Cold temperatures, high winds, fog, and icing conditions produce flying and maintenance problems. The mountainous interior and marshy, frozen coastal plain limit the choice of airfield locations and affect their maintenance.

1. Climate

The high latitudinal position of Novaya Zemlya (70° to 77°N) gives it an arctic climate tempered only slightly by the surrounding seas. Brief, cold summers with drizzling rain and many fogs alternate with long, cold, humid winters. The transitional seasons of spring and fall are very brief. Because the Nordkap Current of the Gulfstream flows to the west of Novaya Zemlya, the temperatures are slightly higher along the west coast than along the east coast. Temperatures are 5 to 7 degrees colder in the northern part of the islands than in the southern part. Mys Zhelaniya at the northern tip of North Island is coldest during March, when temperatures average -4°F (-20°C); but the lowest temperature ever recorded, -33°F (-36°C), occurred in January. August is the warmest month, averaging 36°F (2°C); and the warmest temperature ever experienced at Mys Zhelaniya was 59°F or 15°C. Ozernoye, at the southern end of South Island, is coldest in March, when the average temperature is 1°F (-17°C), with an absolute minimum of -27°F (-33°C). The warmest month is July, when temperatures average 43°F (6°C); the absolute maximum 63°F (17°C), was recorded in August. 9/

The most characteristic feature of the climate is the persistence of strong winds, which occur throughout the year but most frequently

from November to March. They reach their greatest intensity at Malyye Karmakuly, where the wind velocity averages 20 miles per hour (8.9 meters per second) throughout the year. The effects of the wind on air operations are more apparent when individual storms, rather than annual averages, are considered. The most frequent storm is the bora, known locally as the stok. During such storms, winds descend from the axial mountain chain to the coastal areas and then move out to sea. The winds gradually abate as they move seaward, and complete calm prevails 10 to 15 miles (16 to 24 kilometers) from land. The occurrence of a bora can often be predicted 6 to 8 hours in advance on the basis of meteorological changes that precede the storm -- marked decreases in air pressure, temperature, humidity, and cloudiness. As the storm begins cloudiness increases and air pressure becomes higher. 10/

During a bora, wind velocities reach speeds up to 83 miles per hour (38 meters per second). The winds do not blow steadily but in gusts separated by intervals of relative calm. During the gusts, any unsecured object is carried away; and blowing dust, sand, and snow limit visibility to a few feet. Boras usually last about 24 hours, but some have continued for as long as 6 days; in 1935, a bora at Malyye Karmakuly blew for 12 days in succession. Flying during such high winds is impossible, and all aircraft must be grounded and tied down securely. In spite of precautions, aircraft may be damaged by flying pebbles and sand. Maintenance work must be conducted indoors during a bora.

Precipitation has a minor affect on air operations since snow and rain restrict visibility only temporarily. Over 75 percent of the precipitation falls as snow and the remainder as drizzly rain. The annual amount varies from 4.6 inches (115 millimeters) at Mys Zhelaniya to 9.5 inches (238 millimeters) at Malyye Karmakuly. These measurements are only approximate since the severe winter winds are likely to blow some of the snow out of the measuring gauges.

Cloud and fog are common on the islands. Clouds, which usually form as low stratus decks, reach their maximum extent during the winter, when 80 percent of the days are cloudy. Cloudiness is at a minimum of 60 percent in early spring; but, with the onset of the spring thaw, cloudiness increases. Fog occurs chiefly in summer when air activity is at its height, and flying is often hampered by poor visibility. The fog forms when warm air from the land passes over the relatively cooler seas. Most fogs last only 12 hours, and visibility is restricted to 660 to 1,640 feet (200 to 500 meters).

Mys Zhelaniya, with 114 days of fog a year, is the foggiest spot on the islands and has a maximum of 22 days of fog a month during July and August. Elsewhere on Novaya Zemlya fogs occur less frequently. Matochkin Shar, with 60 days of fog annually, is one of the stations with least fog because it is dispersed by winds blowing through the strait. 11/

During the summer, rime ice and hoarfrost form on aircraft surfaces when fog and cloud are present. Accumulations of ice must be removed before the aircraft can take off; and, after the craft is airborne, ice must not be allowed to accumulate on the wing and tail surfaces. The Russians are currently experimenting with a method of removing rime ice and hoarfrost from grounded aircraft by the use of hot air pipes and covers. 12/ However, the more laborious method of sweeping off the surfaces by hand is probably more common.

2. Terrain

Scattered, low coastal terraces and other flat areas provide a number of possible sites for airfields. The coastal terraces scattered throughout the littoral areas of Novaya Zemlya reach a maximum width of 7 miles (11 kilometers) at Krestovaya Guba. They are usually flat and some rise in a series of steps to more than 250 feet (76 meters) above sea level (Figures 3 and 4). These terraces, which consist of unstratified deposits of sand, gravel, and boulders up to 100 feet (40 meters) in thickness, are particularly favorable sites for airfields because their level surface and homogeneous composition make possible the construction of airstrips with a minimum of effort. However, the permafrost that underlies all of the islands and the mountainous glacier-covered interior necessitates special construction and maintenance techniques.

From the coast, the land surface of Novaya Zemlya rises gradually to the central mountain chain and reaches a maximum height of 4,000 feet (1,219 meters) at Gora (Mount) Srednyaya, east of Krestovaya Guba (Figure 5). This point also marks the southernmost penetration of extensive glaciers. Farther north, glaciers fill entire valleys; and beyond 75°N an ice sheet covers the land. The average height of this sheet is about 2,625 feet (800 meters), and its thickness varies from 1,300 to 1,500 feet (400 to 460 meters). Numerous glaciers branch from the ice sheet and descend to the sea (Figure 6). Between the tongues of ice are small areas of clear land. Near its northern end the ice sheet diminishes in size and ends about 10 miles (16 kilometers) south of Mys Zhelaniya.

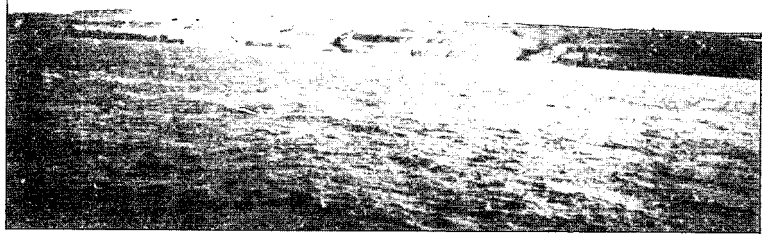

Figure 3. A series of coastal terraces along Proliv Matochkin Shar.

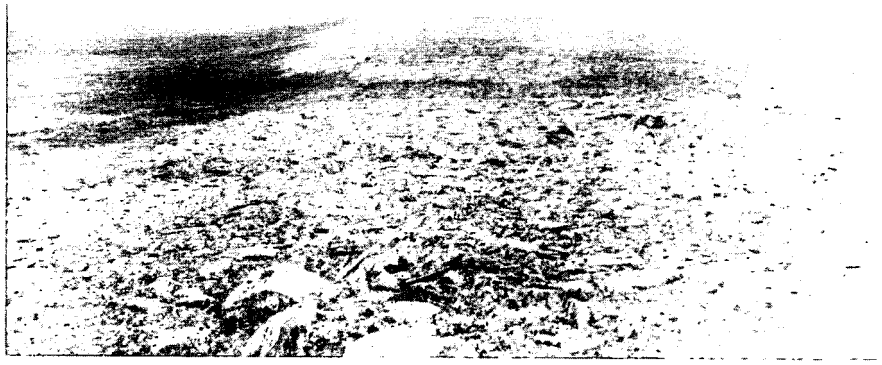

Figure 4. The flat, gravel surface of a terrace near Belush'ya Guba.

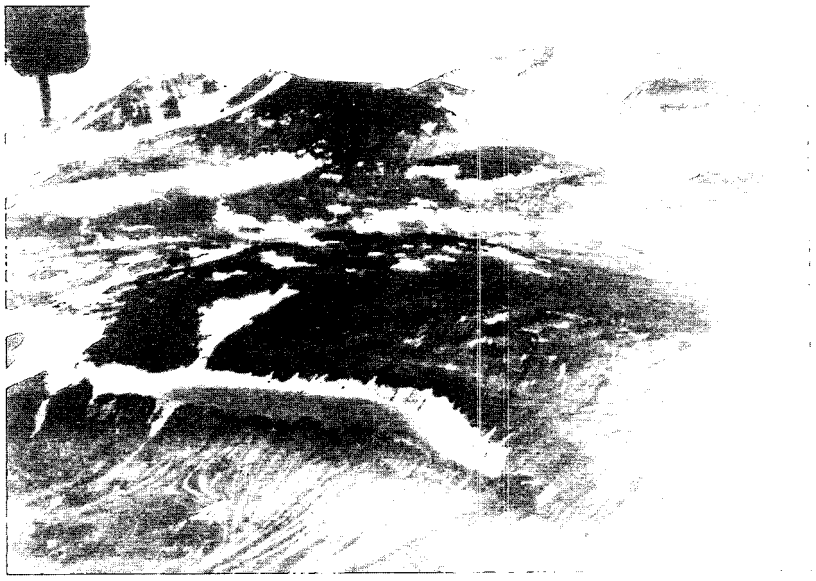

Figure 5. The mountainous interior of Novaya Zemlya near Proliv Matochkin Shar.

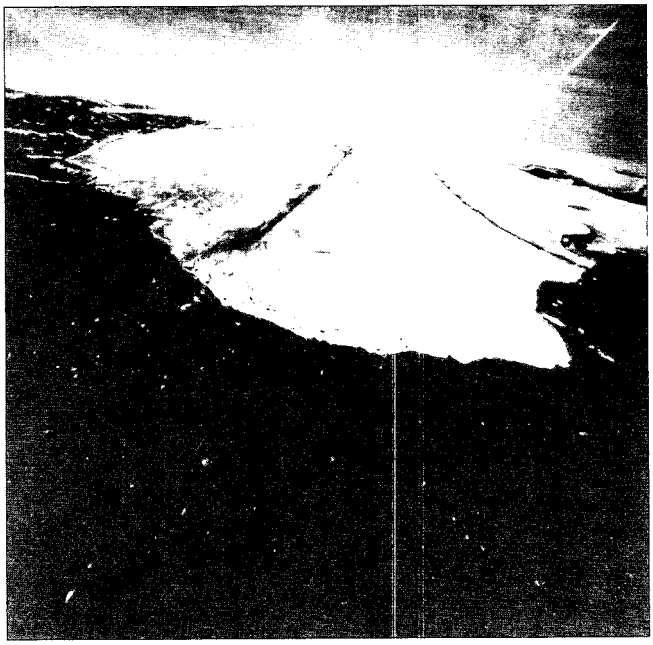

Figure 6. A glacier, probably Lednik Rozhdestvenskogo, entering the Kara Sea.

Since permafrost occurs throughout much of Arctic and sub-Arctic USSR, special research and experimentation is being directed towards the improvement of techniques for the construction and subsequent maintenance of airfields under permafrost conditions. The techniques developed on the mainland are equally applicable to Novaya Zemlya. The runways are usually made of strips or pads of gravel. The surface layer of matted vegetation is left undisturbed so as not to destroy its insulating property. If the vegetation is removed the permafrost melts during the long summer days, and the ground surface becomes a quagmire. At Belush'ya Guba the runways are made of graded natural material, and the other airstrips on Novaya Zemlya are probably constructed in a similar manner. Such airfields are usable throughout the summer, but they cannot be used in spring until the thawed surface has dried out thoroughly. These unpaved surfaces also cause problems in aircraft maintenance, since loose gravel is likely to be sucked into jet engines and damage the turbine blades.

III. Naval Activities

Although naval activity is usually limited to local shipping and Northern Sea Route traffic, naval maneuvers were held in the area during September and October 1957. Newspapers announced that the Northern Fleet would conduct training exercises with up-to-date weapons in the Barents and Kara Seas and warned all Soviet and foreign ships and aircraft away from a large area surrounding Novaya Zemlya. 13/ The weapons tested were no doubt atomic since dates of the maneuvers coincide with those of nuclear tests held in the area.

Supply ships from the mainland visit polar stations and other settlements along the coast during the summer navigation season to deliver food, medical supplies, and new personnel. In 1955 the Chiaturi, a combination freighter and passenger ship powered with diesel-electric engines, delivered supplies of fresh vegetables and consumer goods from Arkhangel'sk to Novaya Zemlya, calling at Rusanovo, Malyye Karmakuly, Krestovaya Guba, and other points. The Chiaturi probably made only two trips during the navigation season since its second voyage began in late September. Sea traffic was no doubt considerably heavier than normal in 1955 and 1957, since the atomic tests conducted at Novaya Zemlya required special deliveries of construction material and research equipment.

Northern Sea Route ships can pass Novaya Zemlya by three routes: between the two islands via Proliv Matochkin Shar, around the southern tip at Proliv Karskiye Vorota (literally, Gate), or around its northern extremity at Mys Zhelaniya. Ice conditions prevailing at the time determine which route will be used. Most traffic uses the Proliv Matochkin Shar and Proliv Karskiye Vorota routes since they are blocked with ice less often that Mys Zhelaniya.

Proliv Matochkin Shar is a narrow, winding strait 62 miles (100 kilometers) long and 0.25 to 3 miles (0.4 to 5 kilometers) wide (see map No. 25882 and Figure 7). Anchorages are found throughout the strait and depths vary from 33 to 656 feet (10 to 200 meters). During the navigation season (late July to the end of October), navigation lights and beacons are displayed along the entire length of the strait, and ships can sail through without assistance. 14/

Proliv Karskiye Vorota lies between Novaya Zemlya and Ostrov Vaygach. The strait extends in a northeast-southwest direction for 17 miles (27 kilometers) and is 32 miles (53 kilometers) wide. On both sides the strait is fronted by numerous islands and shoals, reducing the usable width to only about 13 miles (21 kilometers).

A number of large above-water rocks and a shoal area lie northeast of Mys Zhelaniya, but ships of any draft can pass north of this area (Figure 8).

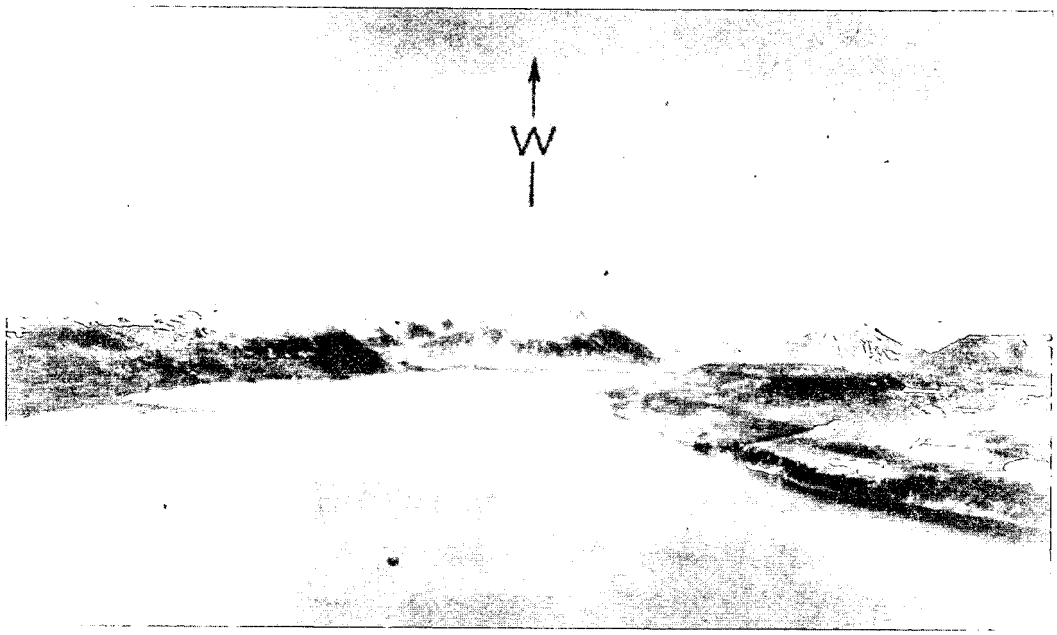

Figure 7. View of the eastern part of Proliv Matochkin Shar looking westward from Mys Snezhnyy.

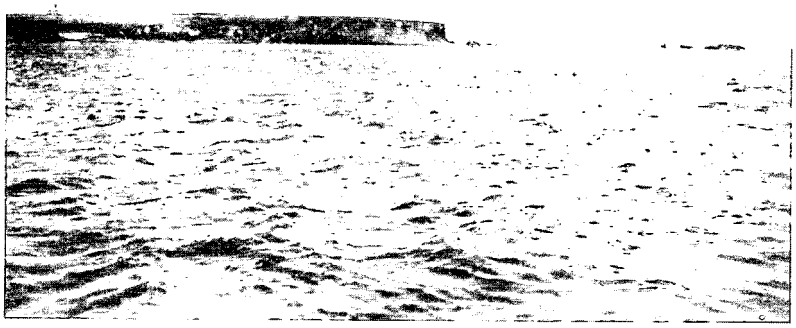

Figure 8. The steep headland of Mys Zhelaniya with above-water rocks lying close off shore.

Novaya Zemlya is well located for use as a base for naval operations in the Barents and Kara Seas, but no available information indicates any such use at present. Many deep, sheltered coastal fiords could serve as anchorages for both surface vessels and submarines. During World War II, German U-boats based on Novaya Zemlya operated in the southern Barents Sea and in the Kara Sea as far east as Proliv Vil'kitskogo. In the summer of 1943, there were bases at Mys Konstantin, Mys Sporyy Navolok, and Mys Pinegina. A total of 6 submarines operated from these bases. In three seasons, they sank 11 merchant ships, 1 destroyer, and 2 survey vessels; shelled the station at Malyye Karmakuly; and laid numerous mines in Proliv Matochkin Shar and Proliv Karskiye Vorota. 15/

The factor most important in limiting the use of Novaya Zemlya as a naval base is the short ice-free navigation season. Vessels can operate for only a few months during the summer without the risk of becoming frozen in the ice. Ice conditions vary greatly from year to year, and these conditions are further complicated by interrelations of the relatively warm Nordkap Current of the Gulfstream, the cold Kara Sea, and changing winds. Generally the west coast is not free of ice until the beginning of July but in some years the coast is entirely ice-free by the end of May. In recent years, the sea north of Novaya Zemlya has usually been ice-free in summer, but occasionally it is blocked all summer. (Figure 9). Because of the cold water of the Kara Sea, ice conditions are more severe on the east coast than on the Barents Sea coast. In most years, ice is found along the east coast until August or September; but offshore winds can temporarily move the ice several miles out to sea. For Novaya Zemlya as a whole, optimum conditions occur in the fall after the old sea ice melts and before the young ice forms. At this time, it is sometimes possible to circumnavigate the islands.

After the coastal areas have cleared, the sea swell and relatively warm surface water breaks up and melts the ice in the bays. The western part of Proliv Matochkin Shar becomes clear of consolidated ice about the end of May or the beginning of June and the eastern part in early July. The strait is almost always free of ice from late July until the end of October. By mid-November it is entirely frozen (Figure 10). 16/

Figure 9. Terrain near Mys Zhelaniya. A stream with braided channels drains the inland ice cap, and a narrow belt of open water separates sea ice from the mainland.

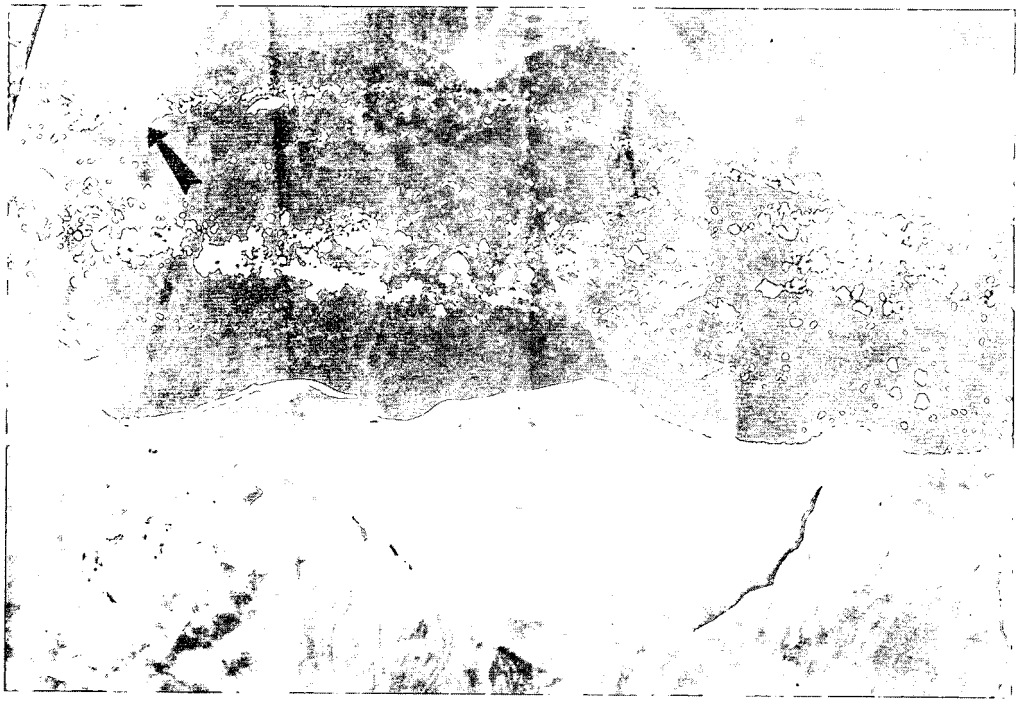

Figure 10. The western part of Proliv Matochkin Shar, showing scattered ice remaining in late August. Arrow indicates the settlement of Lagernoye.

IV. Support Facilities for Air and Naval Operations

Air and maritime operations in the Novaya Zemlya area are served by a well-developed and coordinated system of support facilities, including polar stations, radio and radar networks, and ports and landings. Polar stations are scattered throughout the length of the islands from Mys Zhelaniya to Mys Men'shikova. The radar system has expanded in recent years, and Novaya Zemlya is now completely covered by an aircraft control and warning system. 17/ A network of radios connects many of the inhabited areas of the islands and also links the islands with the mainland. Only a few locations on Novaya Zemlya have port facilities at present, but many other anchorages and landing areas could be developed.

A. Polar Stations

The polar stations on Novaya Zemlya conduct meteorological, hydrological, aerological, cryological, actinometric, and magnetic observations. Current data on weather and ice conditions are broadcast to nearby aircraft and ships, and weather observations are sent to collection points on the mainland to be coordinated with data from polar stations in other parts of the Arctic.

Of the 10 polar stations currently operating on Novaya Zemlya, 18/ 7 are under jurisdiction of the GUSMP -- Malyye Karmakuly, Russkaya Gavan', Mys Zhelaniya, Matochkin Shar, Mys Vykhodnoy, Mys Stolbovoy, and Mys Men'shikova. The remaining three -- Belush'ya Guba, Zaliv Blagopoluchiya, and Krasino -- were formerly under the GUSMP but are now probably under the control of the military forces.

Malyye Karmakuly (72°22'N-52°42'E) was the first polar station established in the Soviet Arctic (1882). It is located on a small promontory on South Island and is protected from the open sea by several nearby islands. 19/ The terrain near the station is rolling, but about a mile to the east the land becomes hilly and farther inland rises sharply to the mountains in the interior. 20/ The station made its first observations in 1882 during the First International Polar Year, and continuous observations were initiated in 1896. The program of the station includes geomagnetic research in addition to meteorological and hydrological observations.

The Russkaya Gavan' station (76°14'N-62°39'E) was set up in 1933 at the base of Poluostrov Goryakova, a narrow peninsula jutting into Zaliv Russkaya Gavan'. 21/ Its primary function at that time was to study Lednik (Glacier) Shokal'skogo, which reaches the bay about 1,640

feet (500 meters) south of the station (Figure 11). In 1935 the original function was expanded to include both meteorological and hydrological observations. 22/ The settlement of Russkaya Gavan' is located on the eastern shore of the bay (Figure 12).

The polar station at Mys Zhelaniya (76°57'N-68°34'E) lies between two small lakes on a low isthmus that separates the Barents Sea from Bukhta Pospelova (Figure 13). It was established in 1931 to carry out observations in hydrology, hydrography, actinometry, and meteorology (Figure 14). At that time it included 15 buildings and the number has probably not increased since then. In 1956, all of the buildings were repaired and a tide gauge was reportedly installed. 23/ According to an early announcement the gauge was to be used in connection with the Soviet program for the International Geophysical Year (IGY), but no mention of its use has appeared in recently published IGY notices.

The station at Matochkin Shar (73°16'N-56°24'E), located about 5 miles (8 kilometers) from the eastern entrance to Proliv Matochkin Shar (Figures 15 and 16), was established in 1923 as a geophysical laboratory but also conducted meteorological and aerological observations. In 1933, it was taken over by GUSMP. Shortly thereafter two substations were set up at Mys Vykhodnoy and Mys Stolbovoy to aid the Matochkin Shar station in its work. Only the magnetic and some meteorological functions were retained by Matochkin Shar, probably because observations were affected by its unfavorable position in the strait. Pilot balloons especially, were influenced by winds funneling through the strait. 24/

The polar station at Mys Vykhodnoy (73°14'N-56°43'E) is located on a headland bluff on the northern side of the eastern entrance to Proliv Matochkin Shar. The station took over the bulk of geophysical and meteorological work from Matochkin Shar since its more exposed position was better suited for making observations. After World War II, Mys Vykhodnoy gradually assumed nearly all the functions of Matochkin Shar. 25/

Mys Stolbovoy polar station (73°17'N-53°56'E) is located on the south shore at the western end of Proliv Matochkin Shar (Figure 17). It was established in 1934 as a substation of Matochkin Shar and during its early years made hydrometeorological observations. Since recent reports give no indication of current subordination to any other station, it can be assumed Mys Stolbovoy now operates independently and continues to record hydrological and meteorological data. 26/

Figure 11. The front of Lednik Shokal'skogo as it enters Zaliv Russkaya Gavan'.

Figure 12. The settlement of Russkaya Gavan' on the east shore of the bay.

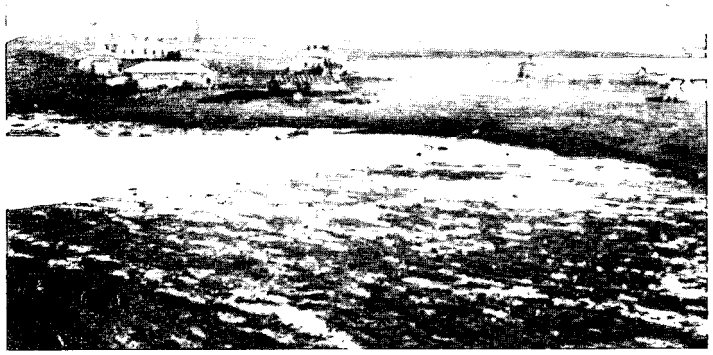

Figure 13. Mys Zhelaniya polar station (1937). The station, which lies between two small lakes, has probably not expanded beyond its original fifteen buildings.

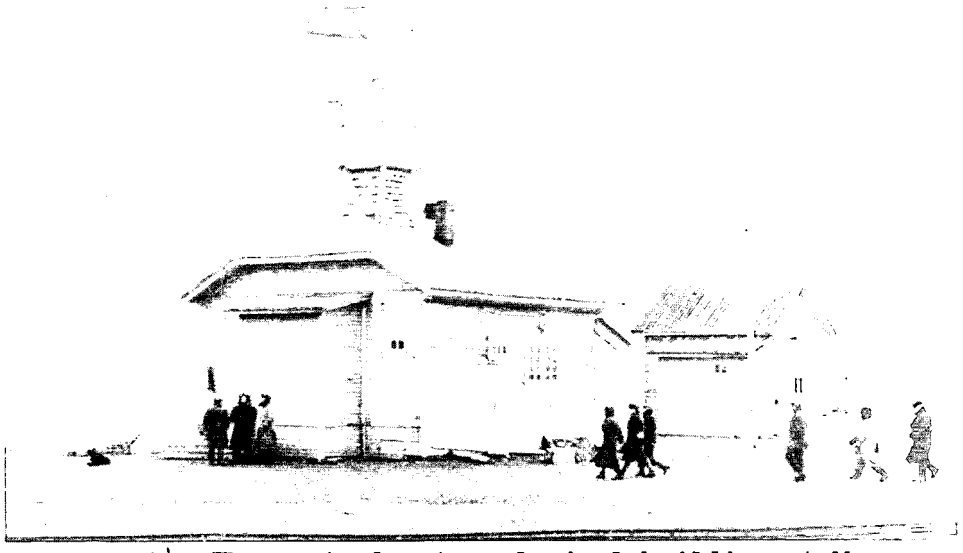

Figure 14. The central meteorological building at Mys Zhelaniya. The track in the foreground is used to transport supplies from the beach to the station.

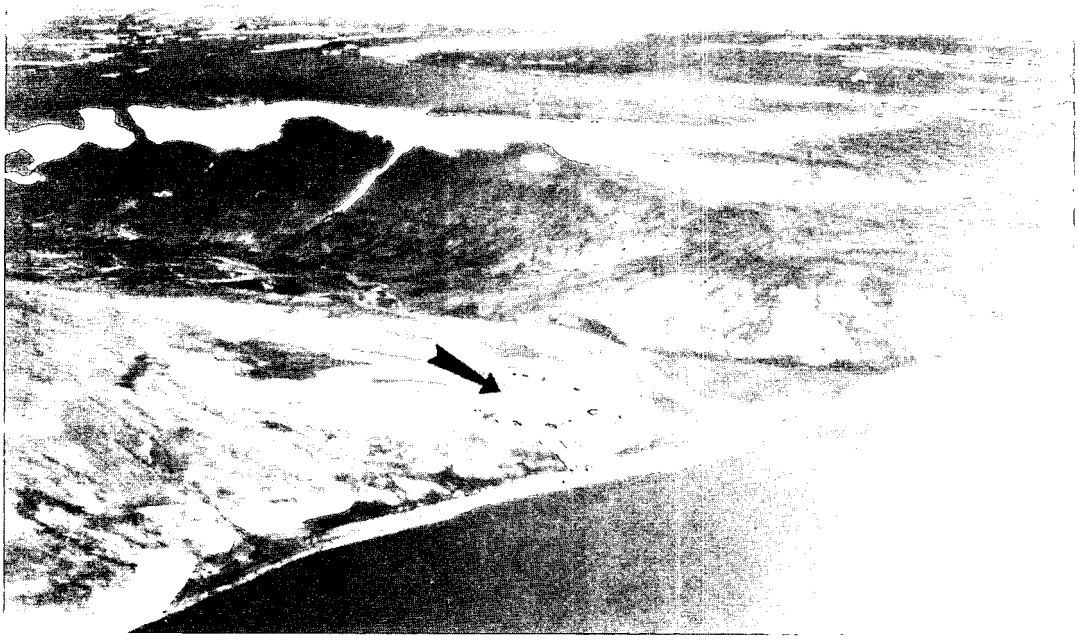

Figure 15. Aerial view of Matochkin Shar polar station.

Figure 16. The radio station and tower at Matochkin Shar polar station.

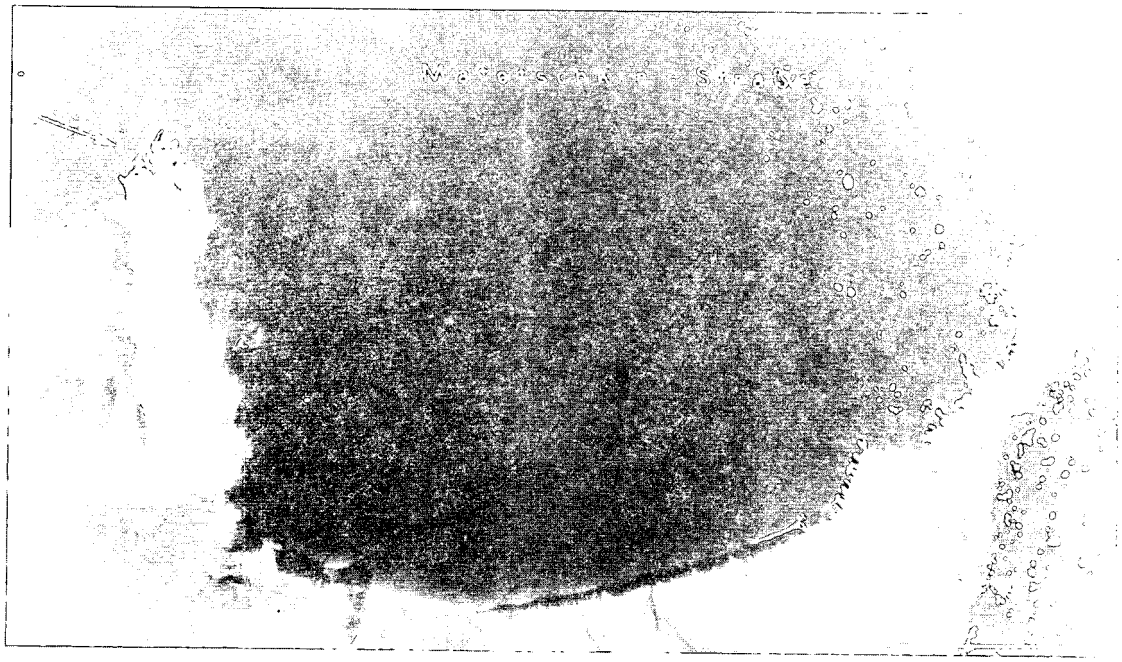

Figure 17. Aerial view of Mys Stolbovoy polar station (arrow). In the early 1940's the station consisted of eight buildings.

The polar station at Mys Menshikova (70°42'N-57°36'E) is situated near the southern tip of South Island. The first indication of a station at this site was its identification on a 1956 map. 27/ It probably was established to replace the old station at Ozernoye (also known as Karskiye Vorota) 13 miles (21 kilometers) to the southwest. The move may have been made to furnish a better landing site for aircraft since Poluostrov Piritovy, on which the Ozernoye station was located, appears to be too hilly for the construction and operation of a suitable airstrip. A point near the Ozernoye station site where the peninsula is less than 2 miles (3 kilometers) wide has an elevation of 213 feet (65 meters). At Mys Men'shikova and to the west and northwest of it the land is more nearly level and provides a number of potential sites for airstrips. 28/

The three polar stations not shown as under GUSMP jurisdiction on the 1956 map -- Belush'ya Guba, Zaliv Blagopoluchiya, and Krasino -- were probably taken over by Soviet military forces; it is unlikely that their extensive scientific facilities would be closed down completely.

The Belush'ya Guba polar station (71°31'N-52°19'E) was established during World War II and at that time had a staff of 17 people. It carried on general meteorological observations; aerological work, including radiosonde and pilot balloon flights; and hydrological work such as observations of water temperature and level, sea waves, and ice conditions. The station was also capable of doing actinometric work on special request. 29/ Belush'ya Guba is now probably operated by the Soviet Navy.

The polar station at Zaliv Blagopoluchiya (75°42'N-63°41'E) on the eastern shore of Zaliv Blagopoluchiya, sometimes called Poluostrov Somneniy, is the only station on the east coast of North Island between Mys Zhelaniya and Mys Vykhodnoy. It was set up in 1936 to make meteorological and hydrological observations. In the late 1930's the station supplied weather data 8 times a day to special aircraft flights in the area. 30/ At present, the weather reports are of importance to aircraft flying the following routes, all of which pass near the station: (1) Amderma-North Pole, (2) Dikson -- Zemlya Frantsa-Iosifa, and (3) Kol'skiy Poluostrov-Severnaya Zemlya and points east.

The third polar station no longer listed as under the authority of the GUSMP is at Krasino (70°45'N-54°25'E), a hunting and fishing village on the western shore of Guba Chërnaya. It was established during World War II and is now the site of an airfield and seaplane station.

B. Communications and Radar

1. Communication Facilities

Radio facilities have been reported at nearly every settlement, airfield, and polar station on Novaya Zemlya. There are probably other communications facilities on the archipelago, but they either have not been registered with the International Telecommunications Union or have never been intercepted.

Novaya Zemlya lies in the zone of maximum auroral activity and is subject to magnetic storms which disrupt radio communications. The interruptions may last from a few minutes to several days, during which communication is "blacked out." Since low-frequency radio is affected less by such storms than is high-frequency, the Russians are gradually converting the Novaya Zemlya stations to the low-frequency system. 31/ The radio stations are probably battery-powered since the

Figure 18. A windmill of D-12 type at Mys Zhelaniya. Most of the electricity on the islands is obtained from windmill-generated batteries.

strong and almost incessant winds operate windmills that provide practically unlimited power for generating electricity (Figure 18).

Radio communications are of three categories -- air, maritime, and point-to-point. The air network is primarily used for ground-to-air communication over medium distances. Maritime radio facilities furnish weather and ice information to ships on the Northern Sea Route. The domestic point-to-point facilities integrate stations on the islands with those on the Soviet mainland. Nearly all transmitters provide radiotelephone and continuous wave or modulated continuous wave radiotelegraph service. Many of the stations provide more than one type of service, many using the same transmitter and call signs with differences sometimes only in frequencies and in power. 32/

Mys Zhelaniya is the only transmitter officially acknowledged to be operating at as much as 1 kilowatt, but the other stations may be operating at more than their listed power. The range of the Mys Zhelaniya station extends for a considerable distance into the Arctic Ocean and serves as a navigational aid to aircraft on polar flights.

2. Radar Installations

The Soviet Arctic is reportedly guarded by radar throughout most of its extent, and the cover is complete from Dikson westward to the Norwegian border. 33/ Nine radar sites have been identified on Novaya Zemlya and there are very probably others. Mys Middendorfa has an Early Warning (EW) radar, and at least three radars -- two Ground Control Intercept (GCI) and one EW -- are in operation at Belushya Guba. 34/ At 5 of the sites -- Krasino, Mys Chërnyy, Mys Brandta, Krestovaya Guba, and Mys Zhelaniya -- the type and function of the radar is unknown. 35/

C. Ports and Landings

No ports and landings have been developed on Novaya Zemlya, but numerous deep, sheltered anchorages could provide sites for naval bases or landings for airfields and polar stations. Such developments will probably be undertaken only if required on a high priority basis because of the difficult climatic and ice conditions.

The only known port facilities on Novaya Zemlya are at Belush'ya Guba. Ships can anchor anywhere in the northern part of the bay, Guba Belush'ya, beyond the shoal water bordering the shore. The bay has sufficient space for anchoring 10 ships, each with a free-swinging radius of 450 feet (137 meters). Vessels can also anchor nearer to the settlement which is located on Bukhta Samoyed, an arm of Belush'ya Guba (Figures 2 and 19). The curving shore along the eastern side of Bukhta Samoyed forms a bight 3,000 feet (914 meters) long. A single wooden wharf 200 feet (69 meters) in length with alongside depth of 16 feet (5 meters) has been built along the bight, which may have been dredged in recent years to allow freighters of deeper draft to anchor. Guba Belush'ya, including Bukhta Samoyed, is often free of ice from the end of June to the beginning of November. The date on which the bay becomes clear of ice depends on the wind; northerly winds drive ice out of the bay, whereas southerly winds force ice to reenter it. Guba Belush'ya is well sheltered, and only the infrequent southerly winds raise large waves. 36/

Near the wharf are eight large fuel tanks. Tankers and barges are probably used to increase the POL storage space. Coal is used for heating the buildings and is probably stored in widely scattered dumps to minimize the danger of fire.

Port facilities at Bukhta Nikitina have also been described, but their existence is doubtful. According to a PW report the bay contains several wooden wharves, traveling steam-powered cranes, small

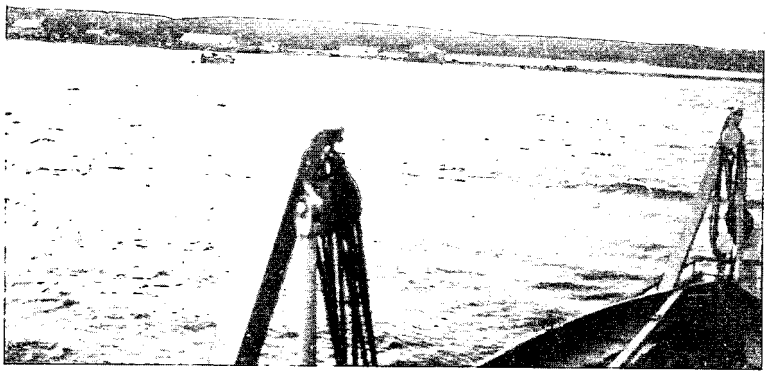

Figure 19. A part of Belush'ya Guba settlement viewed from a ship anchored in Bukhta Samoyed.

floating cranes, and several long, wooden, one-story warehouses. 37/ Since there are no indications of military, scientific, or economic activities in the area and since no overland transportation is available, the report is probably erroneous. The source may have been describing Belush'ya Guba.

Sheltered anchorages are numerous in the coastal indentations of Novaya Zemlya, especially on the southern and western coasts of the two main islands. Nearly all offshore waters along the entire eastern coast of North Island are too deep for anchoring, but some coastal indentations provide shelter. Polar stations usually have favorable anchorages nearby. The northeastern shore of Zaliv Russkaya Gavan', which is 10 miles (16 kilometers) long and 5 miles (8 kilometers) wide, provides good anchorage for the station; and Mys Zhelaniya uses the northeastern shore of Bukhta Pospelova. 38/

V. Current Scientific Role of Novaya Zemlya

Novaya Zemlya has become an important area in two current Soviet scientific programs -- nuclear testing and participation in the IGY. Nuclear explosions have occurred on North Island and in the offshore waters south of the islands. IGY observations are being made at several polar stations on North Island.

A. Nuclear Tests

Five nuclear explosions have occurred in or near Novaya Zemlya since 1955. On 21 September of that year, an explosion yielding about 20 kilotons took place underwater off the southern tip of South Island. The settlement of Krasino and its airfield and polar station facilities qualify as the support area for this test. Recording and measuring instruments could be flown or shipped to the settlement and personnel could temporarily be housed there.

Nuclear tests in the Novaya Zemlya area were resumed in the fall of 1957, when 4 explosions occurred. On 7 September, a weapon yielding about 25 kilotons was detonated near the site of the earlier underwater test. On 24 September and 6 October, weapons yielding about 3 and 4 megatons, respectively, were tested at a new proving ground on North Island at 73°48'N-54°24'E. On 10 October, an explosion with a yield of about 20 kilotons occurred at 70°36'N-54°12'E and appeared to have been detonated underwater. The location, size, and position of this test were similar to those of the first one, conducted in September 1955 near Krasino.

The nuclear tests conducted on Novaya Zemlya thus far suggest two types of use. The two high-yield explosions conducted at a weapons proving ground on North Island were probably for research purposes. The tests in the waters off the southern coast of South Island were very likely associated with naval activities. The 21 September 1955 test was probably a naval directed explosion. The explosions on 7 September and 10 October 1957 were undoubtedly associated with the up-to-date weapons used during naval maneuvers held in the Barents and Kara Seas from 10 September to 15 October. 39/

Novaya Zemlya has several advantages that make it a suitable nuclear test site. Favorable upper air trajectories carry radiation fallout away from the mainland. The barren landscape and sparse population also favor its use. According to one report the evacuation of the present meager population is being considered in preparation for further tests. 40/ The island's isolated position provides a testing area with minimum possibility of foreign surveillance. During the 1955 test the coastal waters on the southern tip of Novaya Zemlya and Proliv Karskiye Vorota were closed. 41/ Prior to the 1957 tests the entire coastline and large

areas of the offshore waters of the islands were closed, and on the western coast the boundary of the restricted zone was placed more than 200 miles (320 kilometers) from the islands. 42/

B. International Geophysical Year Observations

During the IGY, an extensive program of scientific observations is in operation at the Mys Zhelaniya, Russkaya Gavan', and Mys Vykhodnoy polar stations. 43/

Meteorological observations are made at Mys Zhelaniya and Russkaya Gavan'. Standard observations are made four times daily and include air temperature and pressure, wind velocity and direction, cloudiness, visibility, type and quantity of precipitation, amount of snow cover, and duration of sunlight.

Geomagnetic observations are carried out at Mys Vykhodnoy. Magnetic measurements are now in progress, and the installation of a storm magnetograph which will record extraordinary magnetic disturbances is planned.

Aurora studies are planned for Mys Zhelaniya, where an all-sky camera (C-180°) will take motion pictures of the sky at specific intervals on all clear nights.

Oceanographic observations, which include measuring the temperature and salinity of the water as well as fluctuations in sea level, are in progress at Russkaya Gavan'.

Extensive glaciological investigations will also be undertaken at Russkaya Gavan'. A glaciological expedition of the Institute of Geography of the Academy of Sciences will establish a camp on Lednik Shokal'skogo, 2,520 feet (770 meters) above sea level, where ice temperatures within the glacier and other glacial phenomena will be measured. Changes in the glaciation of Novaya Zemlya can be deduced by comparing these data with those collected during the Second International Polar Year, 1932-33. 44/

VI. Population

Novaya Zemlya has the largest population of any of the islands in the Soviet Arctic. The first permanent settlers arrived in 1869. Before this, Russian and Norwegian hunters, fishermen, and traders visited the islands but did not remain through the winter. 45/ As Nentsy and Russians migrated to the islands the population gradually increased and by 1937 numbered about 400 -- 300 Russians and 100 Nentsy. Since then, the population has probably increased many fold as more Russians arrived to operate the airfields, polar stations, and other installations and PW's were sent to work in the mines. The number of Nentsy has probably increased very little. Some may be employed in nontechnical tasks at polar stations and airfields, but the majority are probably hunters, herders, trappers, and fishers living at a near-subsistence level (Figure 20).

Most of the population is concentrated at polar stations and other settlements along the coast of the islands. The interior is uninhabited except for migratory Nentsy reindeer herdsmen and occasional seasonal hunters. Most of the polar stations are staffed with 4 to 10 persons, but some of the larger ones such as Belush'ya Guba may have more. The only other settlements consist of a few houses inhabited by Russians or Nentsy engaged in fishing, hunting, and trapping (Figure 21).

Forced labor, which comprises a large part of the population, is used chiefly in prospecting and mining. Six camps are known to be located on the island and there are possibly more. Prisoners from a camp north of Zaliv Rogacheva were engaged in prospecting for oil in 1949, but no evidence indicates that their efforts were successful. 46/ In 1951, a camp near Matochkin Shar polar station housed 850 prisoners who worked in a nearby copper-pyrite quarry. 47/ The 1,500 to 2,000 prisoners assigned to a large camp near the southwestern coast of North Island in 1952 worked in an iron mine and ore processing plant. 48/ Three other camps on North Island have not been located, but they are probably near Russkaya Gavan'. 49/

The free population is organized into collectives which import supplies and export hunting products to various cities on the mainland. The population is governed by an island soviet (council), which until recently met annually in early May at Belush'ya Guba. 50/ Meetings are probably now held at Lagernoye, a more centrally located settlement (Figures 22 and 23). The soviet controls the education, medical service, political indoctrination, and cultural activities of the natives. 51/

Figure 20. A Nentsy family and its small boats at Guba Chërnaya.

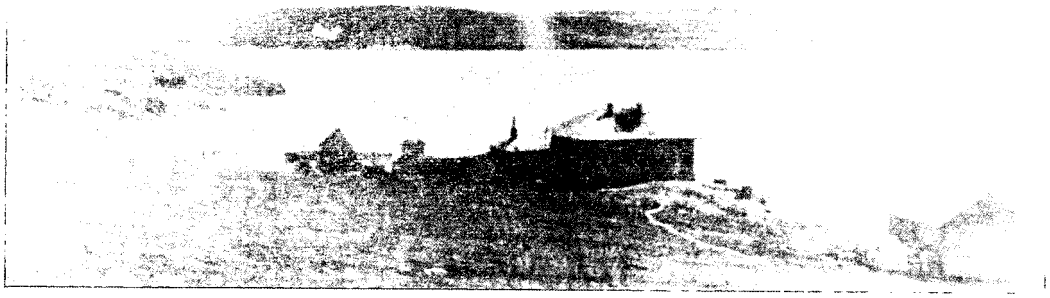

Figure 21. The fishing settlement of Russanovo near the southern tip of Novaya Zemlya (1945).

Figure 22. A distant view of the settlement of Lagernoye (1937).

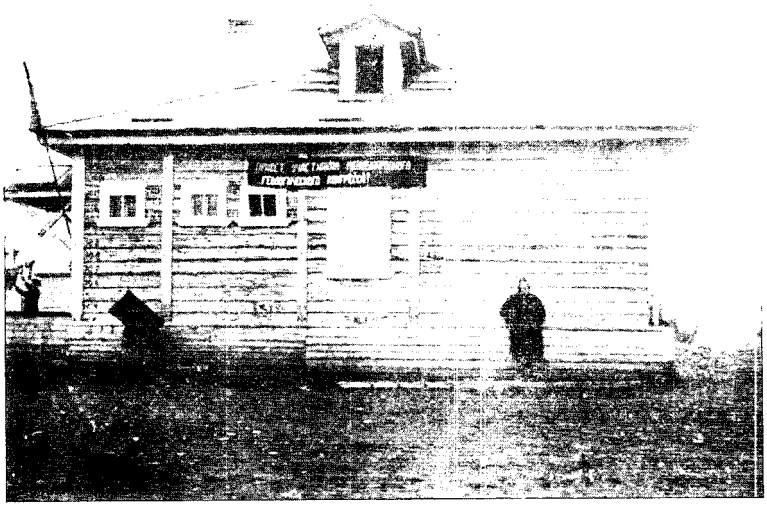

Figure 23. The town hall of Lagernoye. The timbers were numbered to facilitate the assembling of the building.

Most settlements have schools and a 7-year boarding school is located at Belush'ya Guba (Figure 24). The current Soviet goal is a universal 7-year education, but this will be difficult to achieve on Novaya Zemlya since the small population is scattered over a large area. A few Nentsy receive a higher education and are trained as teachers and scientists. They attend the Peoples of the Extreme North Section of the A.I. Gertsen (Hertzen) Pedagogical Institute in Leningrad. 52/

Figure 24. The boarding school at Belush'ya Guba.

Infirmaries and first aid stations are scattered throughout Novaya Zemlya, a doctor is available in every settlement, and a maternity home has been established for the islands. Hospitals are located in Belush'ya Guba and Lagernoye, the latter having a 30-bed capacity.

The inhabitants of the islands usually travel by motor boat or dog team. Boats are used during the summer for coastal travel and dog teams are used in the winter or for inland travel. Reindeer, airsleighs, and caterpillar tractors are also used for transportation.

VII. Economic Activities

The local economy of Novaya Zemlya currently provides little support for air and naval activities of the islands; and the Russians who operate the airfields and polar stations and the forced laborers who work in the mines contribute little to the local economy. The native Nentsy live off the land and sea at a near-subsistence level, their only export of importance being hides and furs and their only contribution to the Soviet population being meat and fish. The Russians, on the other hand, import most of the food they consume and other materials they require. Of the minerals exploited, only coal is consumed locally; other mining activity is dictated by overall Soviet planning.

A. Mining

Mines are located at several points along the western coast of Novaya Zemlya, and their distribution seems to indicate they were discovered by prospecting at preselected sites. Probably the geologists who did the field work were based at polar stations during the summer, and their investigations were limited to areas adjacent to the stations. The two richest sites are near Belush'ya Guba and Russkaya Gavan'. The islands are no doubt richer in minerals than current exploitation indicates, but any new discoveries are unlikely to be exploited because of the isolated position of the archipelago. Many of the mineral resources may never be exploited; others, such as uranium, have strategic value sufficient to justify exploitation regardless of their location. Materials that can be used for building purposes are found throughout the islands, but they are little used and most of the materials for housing are imported from the mainland.

Uranium is probably the most strategic mineral found on the islands, and an unlocated mine was reported to be in operation in 1949. It was worked by forced laborers who stockpiled the ore during the winter and loaded it on ships for transport to the mainland during the ice-free season. 53/

Deposits of copper, lead, and zinc ores have been discovered near Proliv Matochkin Shar, but their exact locations are not known. There is no evidence that these deposits are of economic importance. 54/ Copper has also been found at Poluostrov Mednyy on the northern shore of Guba Propashchaya, and mines were opened there in the early 1930's. The copper content ranged up to 1.47 percent, but the average was 0.3 to 0.5 percent. In view of the limited accessibility of the site, the ore is of only marginal economic value. 55/

A mineral containing a high percent of vanadium is found east of Guba Beluzh'ya near the eastern end of Proliv Matochkin Shar, but the economic value of the ore is doubtful since Soviet reserves of vanadium on the mainland appear adequate.

North of Guba Rakovaya, fluorite is found as separate crystals or in dikes 12 to 16 inches (30 to 40 centimeters) thick.

Two possible iron ore mines have been reported on Novaya Zemlya. The locations of the mines are not pinpointed, but the most likely sites are near Russkaya Gavan' and Belush'ya Guba.56/ Although the mines, ore-washing plants, and other installations are described, it is doubtful whether iron ore is actually produced here. Iron mining in such an inaccessible area would not be economically justifiable in view of the richer deposits available elsewhere in the Soviet Union. The magnitude of the installations suggests that the ores may contain rarer metals.

Nonmetallic minerals such as oil, coal, asbestos, and gypsum are also found on Novaya Zemlya. The sedimentary basin containing the Pechora oil field may possibly extend to the archipelago making it part of this "Third Baku." There are no known producing wells on Novaya Zemlya. Since World War II, oil prospecting has been active north of Zaliv Rogacheva, but the results are not known. Although oil seeps have been found near Zaliv Inostrantsev on North Island, the low holding capacity of the rock would prevent any large accumulation of oil.57/

Three open-pit coal mines have been reported 2 miles (4 kilometers) from a port on North Island, probably Russkaya Gavan'. Three daily shifts of forced laborers working by hand load the coal into trailers, which are taken to the port by tracked vehicles. 58/ Coal has also been found in alluvial or glacial deposits at several other places, but the quantities are insignificant.

Building materials -- including limestone, slate, marble, and gypsum -- have been noted at several locations on Novaya Zemlya and are undoubtedly found in many other parts of the islands. Gypsum beds 100 feet (30 meters) thick occur along the western shore of Zaliv Makarova, and the Ostrova Alebastrovyye (Alabaster Islands) appear to be largely alabaster, a variety of gypsum.

B. Collecting Furs and Hides

Furs and hides currently comprise the major item of export from Novaya Zemlya, and their procurement is therefore an important part of the local economy. The most valuable fur-bearing animal is the arctic fox. It is about the size of a small dog and has smoky brown fur that turns white in the winter. The fox is omniverous and feeds on small rodents, birds and their eggs, berries, crabs, mollusks, and carrion. It does not hibernate in winter but roams the snow-covered land and sleeps in abandoned animal burrows. The fox is hunted from December until the middle of March, when its fur is thick and white. In the fall, trappers put out food near their camps to attract the foxes and catch them in steel traps baited with a variety of food. Foxes are caught in large numbers, and 2,000 pelts were exported from the islands annually during the early 1940's (Figure 25).

Other animals furnishing furs and skins include polar bears, reindeer, and seals. Polar bears were formerly a major source of furs, but in recent decades they have decreased in number. In 1932, about 200 live bears and over 1,900 pelts were taken. At present, only a few are shot, and these usually come from the northern and eastern coasts (Figure 26). 59/ Reindeer hides are also exported to the mainland to be made into suede and leather goods of various types. Hides produced in Novaya Zemlya are of good quality since the climate is too cold for the survival of gadflies. These insects lay their eggs in the animal's hair; when the larvae hatch, they bore into the reindeer's skin, leaving it full of holes and worthless for leather. The Greenland seal, bearded seal, and arctic ringed seal are hunted for their skin as well as their oil and meat. Their fur is not so luxurious as that of the fur seal of the Far East; but their hides are made into straps, belts, and other leather articles.

Eider down, obtained from abandoned nests of the eider duck, was formerly collected on the islands and exported to the mainland. The largest eider duck bazar, estimated at 1,000 nests, is on Ostrov Pukhovyy at the southern end of Novaya Zemlya. At present, no eider down is collected or processed, but the Russians hope to revive and to develop the industry. 60/

C. Procuring Food

The majority of foodstuffs consumed on Novaya Zemlya are imported from the Soviet mainland. Fresh vegetables and fruits and canned goods are shipped in during the short navigation season. Additional

Figure 25. Arctic fox pelts hanging from wires at a dwelling at Krasino, where a polar station is located.

Figure 26. A captured polar bear near Mys Zhelaniya. Though once fairly common, polar bears are now seldom found on Novaya Zemlya.

vegetables are grown in greenhouses and hot beds, but they satisfy only a small part of the population's needs. The islands and the surrounding seas, however, could provide much of the meat and fish required by both the native population and the official personnel.

The bearded seal, arctic ringed seal or hair seal, and Greenland seal are found in abundance along the shores. The bearded and arctic ringed seals remain at Novaya Zemlya throughout the winter feeding beneath the sea and breathing through air holes in the ice. The Greenland seal migrates in early spring from Kol'skiy Poluostrov and the White Sea to Novaya Zemlya, Zemlya Frantsa-Iosifa, and Severnaya Zemlya. When winter ice begins to form in late fall the seals return to the south.

Walrus herds have been greatly reduced and are now found along the northeastern coast and only occasionally in other areas. They probably are not an important source of food since the meat, although palatable, is tough.

The belukha or white whale lives in large herds, which frequent coastal waters and river estuaries and often travel upstream in search of fish. Although their meat is tough, it is eaten fresh or canned.

Caribou -- or "reindeer," as the domestic animals are called -- were found in large numbers up to the nineteenth century, when Russian and Norwegian hunters almost exterminated them. In 1928, a herd was introduced from Ostrov Kolguyev, and a reindeer farm was organized. The numbers have increased since then, and the animals now provide the island inhabitants with meat, hides, and milk (Figure 27). The upland tundras in the eastern part of the islands are the best pasture areas, the tundra pastures south of the Savina River being especially rich. 61/

Fish are found in the waters surrounding the archipelago and are especially numerous in the relatively warm Barents Sea. Char are caught chiefly in the fall when they migrate from the sea to inland lakes and rivers and in the spring when they return to sea, but some are also caught beneath the ice during the winter. Cod, herring, mackerel, and pollack are ocean fish; they are caught with nets towed by motor boats and launches. The fish are eaten fresh or are smoked and salted for future use.

Bird eggs form an important part of the native diet, and they are probably also consumed by the Soviet population. Large colonies or bazars of birds inhabit the steep, rocky cliffs on the western

coast of Novaya Zemlya (Figure 28). In 1950, nearly 2,000,000 birds were estimated to be living in 47 bazars; the largest colony, consisting of 350,000 birds, was located at Guba Bezymyannaya. 62/ The most common bird nesting in the bazars is the guillemot, which is about the size of a duck but has a smaller head and a pointed beak. The upper body, head, and wings are black; and the remainder of the body is white. Guillemot eggs are collected in large numbers and eaten by the local inhabitants. They are twice the size of chicken eggs and are equally tasty and nutritious (Figure 29). In the late 1930's, nearly one-half million eggs were collected annually, but in recent years the number has decreased. The birds are used only as dog food since their meat has a strong fish flavor and is not palatable to humans. Until needed, the birds are stored on house roofs out of reach of the dogs (Figure 30).

Figure 27. Part of a reindeer herd on Novaya Zemlya.

Figure 28. A bird bazar near Malyye Karmakuly.

Figure 29. Packing guillemot eggs.

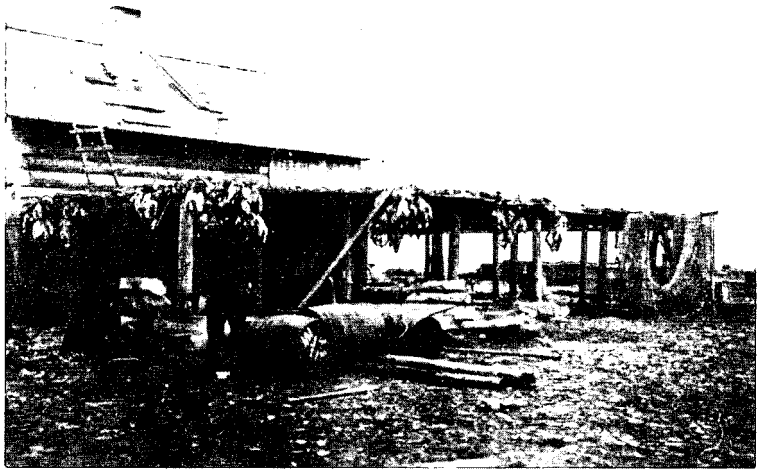

Figure 30. Guillemots hanging from and stored on a roof at Lagernoye. They are used for dog food since their strong fishy flavor is not palatable to humans.

APPENDIX A

GAPS IN INTELLIGENCE

Although an increasing amount of material on the Soviet Arctic is beginning to appear, recent information on Novaya Zemlya is very scarce. Data on economic development is limited to a great extent to prewar sources. Current information on airfield development as well as population growth is sparse and spotty. Information on radar and radio facilities is recent but incomplete.

APPENDIX B

SOURCES AND EVALUATION OF SOURCES

1. Evaluation of Sources

Much of the information used in the study came from classified PW reports and intelligence reports and publications. A small portion of the information used was derived from unclassified periodicals and books in Russian and English.

World War II German aerial photography provided a substantial amount of data on air facilities. The information on mining was obtained for the most part from PW reports, and the information on the nuclear test was derived wholly from classified reports. The discussions of climate, terrain, polar stations, hunting, and herding are based largely on unclassified textual material.

The finished intelligence and PW reports are all of recent date, but most of the unclassified sources are of immediate prewar or earlier date. The sources used are generally reliable, but locations given in the PW reports are often vague.

2. Sources

Evaluations, following the classification entry and designated "Eval," have the following significance:

Source of Information	Information
A - Completely reliable	1 - Confirmed by other sources
B - Usually reliable	2 - Probably true
C - Fairly reliable	3 - Possibly true
D - Not usually reliable	4 - Doubtful
E - Not reliable	5 - Probably false
F - Cannot be judged	6 - Cannot be judged

Evaluations not otherwise designated are those appearing on the cited document; those designated "RR" are by the author of this report and apply only to the specific information incorporated into this report. No "RR" evaluation is given when the author agrees with the evaluation of the cited document.

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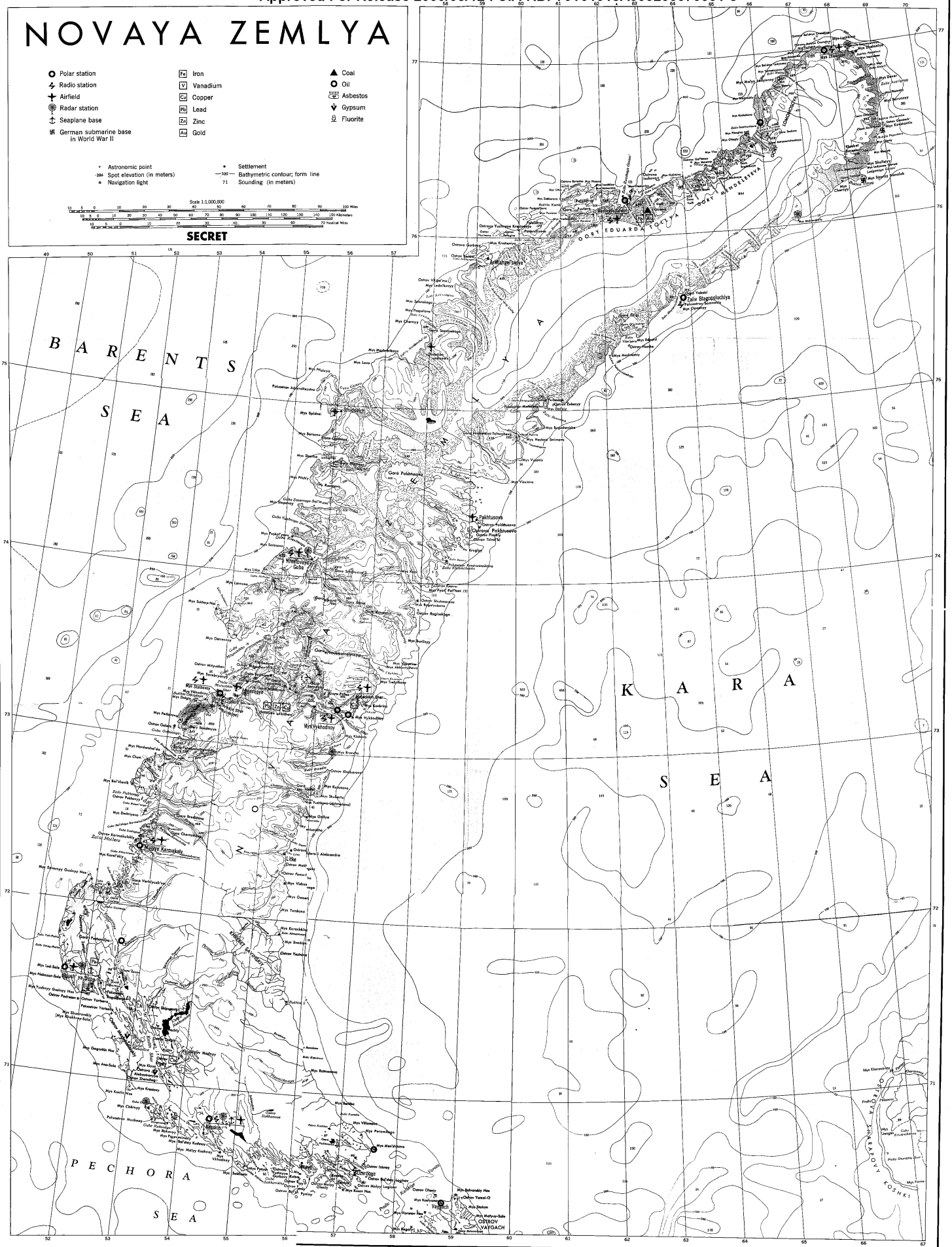

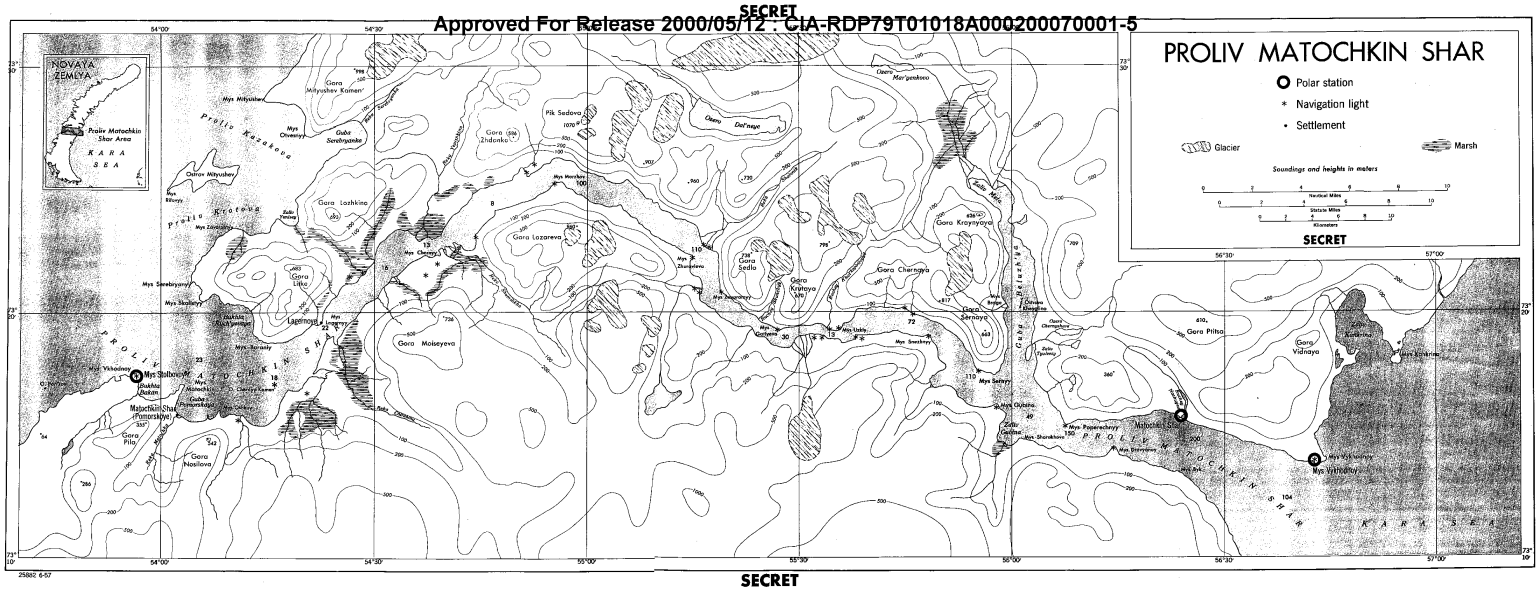

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